CLAIMS

1. A control apparatus for an adaptive adjustment of the input polarization to a polarization-maintaining waveguide component, comprising:

a polarization control unit controlling a polarization state of an input light to the polarization-maintaining waveguide component according to an input signal fed back from an output side of the polarization-maintaining waveguide component so that a polarization of an input light to the polarization maintaining waveguide component matches to a principal axis of polarization of the polarization maintaining waveguide component;

a polarization monitor unit monitoring the polarization state at an output of the polarization-maintaining waveguide component and feeding back a monitoring result to the polarization control unit as the input signal.

2. The control apparatus according to claim 1, wherein

the polarization monitor unit further monitors an existence or disappearance of an optical signal traveling through the polarization-maintaining waveguide component.

3. The control apparatus according to claim 1, wherein

the polarization monitor unit comprises a polarization beam splitter, the polarization beam splitter is aligned to the

polarization-maintaining waveguide component so that the light with the polarization state which matches to the principal axis of the polarization-maintaining waveguide component couples to the through-port of the polarization beam splitter and a light of a drop-port is used for polarization state monitoring.

4. The control apparatus according to claim 3, wherein

a plurality of the polarization control units are provided for an equal number of wavelengths included in the input light,

a tunable wavelength filter is provided after the polarization beam splitter along a feedback path, and

each of the plurality of the polarization control units controls a polarization state of the input light for each wavelength based on a feedback signal obtained by detecting a power of a light passing through the tunable wavelength filter.

5. The control apparatus according to claim 3, wherein

a plurality of the polarization control units are provided for an equal number of wavelengths included in the input light,

a wavelength demultiplaxing unit is provided after the polarization beam splitter along a feedback path and demultiplexing an input light into each wavelength, and

each of the plurality of the polarization control units controls a polarization state of the input light for each wavelength based on a feedback signal obtained by detecting each

power of lights demultiplexed by the demultiplexing unit.

6. The control apparatus according to claim 2, wherein the polarization monitor unit comprises:

an optical power divider placed after the polarization-maintaining waveguide component,

a polarization selective unit connected to one port of the optical power divider with its polarization axis aligned to that of a principal axis of polarization of the polarization-maintaining waveguide component, and

a monitoring unit connected to the polarization selective unit for optical power detection and providing a feedback signal to the polarization control unit.

7. The control apparatus according to claim 6, wherein the polarization selective unit is a polarizer with its through-axis aligned to a desired principal axis of the polarization maintaining waveguide component, and

the monitoring unit is a photodiode connected to an output of the polarizer.

8. The control apparatus according to claim 6, wherein the polarization selective unit is a polarizer with its through-axis aligned to a desired principal axis of the polarization maintaining waveguide component, and

the monitoring unit is a tunable wavelength filter connected to an output of the polarizer.

9. The control apparatus according to claim 6, wherein the polarization selective unit is a polarizer with its through-axis aligned to a desired principal axis of the polarization maintaining waveguide component, and

the monitoring unit is a wavelength demultiplexer connected to an output of the polarizer.

10. The control apparatus according to claim 6, wherein

the polarization selective unit is a polarization beam splitter and the monitoring unit includes two photodiodes connected to two outputs of the polarization beam splitter.

11. The control apparatus according to claim 6, further comprising an optical switch,

wherein

the polarization selective unit is a polarization beam splitter and the monitoring unit, the optical switch is connected to output ports of the polarization beam splitter, and the monitoring unit includes a tunable wavelength filter connected to the output of the optical switch.

12. The control apparatus according to claim 6, further

comprising an optical switch,

wherein

the polarization selective unit is a polarization beam splitter and the monitoring unit, the optical switch is connected to output ports of the polarization beam splitter, and the monitoring unit includes a wavelength demultiplexer connected to the output of the optical switch.

13. The control apparatus according to claim 2, wherein

the polarization monitor unit comprises:

an optical power divider placed after the polarization-maintaining waveguide component,

a wavelength selective unit connected to one port of the optical power divider,

a polarization selective unit connected to the wavelength selective unit with its plarization axis aligned to that of a principal axis of polarization of the polarization-maintaining waveguide component, and

a monitoring unit connected to the polarization selective unit for optical power detection and providing a feedback signal to the polarization control unit.

14. The control apparatus according to claim 13, wherein

the wavelength selective unit is a tunable wavelength filter and the polarization selective unit is a polarizer.

15. The control apparatus according to claim 13, wherein the wavelength selective unit is a tunable wavelength filter and the polarization selective unit includes a polarization beam splitter and photodiodes connected to the polarization beam splitter.

16. The control apparatus according to claim 13, wherein the wavelength selective unit is a wavelength demultiplexer and the polarization selective unit includes a polarization beam splitter connected to output ports of the wavelength demultiplexer and photodiodes connected to the polarization beam splitter.

17. The control apparatus according to claim 1, wherein the polarization monitor unit comprises:

an optical power divider placed after the polarization-maintaining waveguide component, and

a polarimeter analyzing the state of polarization and providing a feedback signal to the polarization control unit.

18. The control apparatus according to claim 1, wherein the polarization monitor unit comprises:

an optical power divider placed after the polarization-maintaining waveguide component,

a tunable wavelength filter connected to one output port of the optical power divider, allowing monitoring one of a plurality of wavelengths, and

a polarimeter analyzing the state of polarization and providing a feedback signal to the polarization control unit.

19. The control apparatus according to claim 1, wherein the polarization monitor unit comprises:

a power divider unit connected after the polarization maintaining waveguide component, and

a spectrum monitor unit connected to one of the output ports of the power divider, analyzing spectrum of a received light, and generating feedback signal to the polarization control unit.

20. The control apparatus according to claim 19, wherein the spectrum monitor unit is an optical spectrum analyzer.

21. The control apparatus according to claim 19, wherein the spectrum monitor unit includes a wavelength selective filter and a photodiode detecting the power of the light passing through the wavelength selective filter.

22. The control apparatus according to any one of claims 19 through 21, wherein

a plurality of the polarization control units is provided for each wavelength and a wavelength multiplexed light is inputted to the polarization maintaining waveguide component.

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